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THE TAXONOMIC STATUS OF *ENCARSIA*, *PROSPALTELLA*, AND *TRICHAPORUS* AND A DESCRIPTION OF *PRIMAPROSPALTELLA*, NEW GENUS (HYMENOPTERA: CHALCIDOIDEA: APHELINIDAE)

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Abstract.—The status of the genera *Encarsia* Foerster, 1878, *Prospaltella* Ashmead, 1904, and *Trichaporus* Foerster, 1856 is clarified. A characterization of *Encarsia* is given. The type-species of *Prospaltella* is *Coccophagus aurantii* Howard, 1894 not *Prospalta murtfeldtae* Howard, 1894. *Prospaltella* is a synonym of *Encarsia* as per Viggiani and Mazzone, 1979. **Primaprospaltella** n. gen. is described with the type-species *Prospalta murtfeldtae* Howard, 1894.

Trichaporus Foerster, 1856 and *Trichoporus* Ashmead, 1900 are objective synonyms, with the type-species *Euderus columbianus* Ashmead, 1888. These genera are properly placed in the Eulophidae, not the Aphelinidae, where they are both senior objective synonyms of *Galeopsomyia* Girault, 1916. Due to the confusion and disruption the proper placement of these genera would cause, the authors are requesting in a separate appeal to the ICZN that the generic names *Trichaporus* Foerster, 1856 and *Trichoporus* Ashmead, 1900 be permanently suppressed and placed on the Official List of Rejected and Invalid Generic Names in Zoology.

For some time there has been confusion regarding the proper placement of species in the genera *Prospaltella*, *Encarsia*, and *Trichaporus* as well as whether one genus or another is synonymous with one or both of the others. Various viewpoints have been put forward and the matter reviewed by numerous authors including Nowicki (1929), Mercet (1930a, 1930b), Dozier (1933: 91–92), DeSantis (1948), Flanders (1953), Boucek (1963: 273), Nikol'skaya and Trjapitzin (1965), Ferriere (1965), Nikol'skaya and Jasnosh (1966), and Viggiani and Mazzone (1979). However, there still remains a need for clarification.

This need became evident over the past several years during studies of aphelinid parasites of whitefly and diaspidid scale insects. On various oc-

casions we studied museum material and found that obviously congeneric very closely related species, sometimes even conspecific material, had been referred to different genera. This led to a study of all the original specific and/or generic descriptions, the type-species of the genera involved, additional species assigned to these genera, to certain related genera, and pertinent literature.

Status of *Prospaltella*

Prospaltella Ashmead, 1904

Type-species.—*Coccophagus aurantii* Howard, 1894, type by designation under the plenary powers.

This genus was made a junior synonym of *Encarsia* Foerster, 1878 (Viggiani and Mazzone, 1979).

Howard (1894: 6) described *Prospalta* in the Aphelininae. The name *Prospalta* was preoccupied by Walker (1857: 1114) in the Lepidoptera. Ashmead (1904a) supplied the replacement name *Prospaltella* for *Prospalta* Howard.

Prospaltella has been repeatedly listed in catalogs as being monotypic (Peck, 1951: 437; Peck, 1963: 275; Gordh, 1979: 907), but it is not. Howard (1894) follows his original description of this genus with the description of the new species *Prospalta murtfeldtii*. Following this description he adds "To this genus may also be referred *Coccophagus aurantii* How. described in Insect Life (Vol. VI, p. 231)." Thus this genus is not monotypic as it has two species (*P. murtfeldtii* and *P. aurantii*) originally ascribed to it. Neither of these species was designated as the type-species by Howard.

Prospaltella murtfeldtii was named for a Miss Mary M. Murtfeldt, hence Peck (1951: 437), acting in accordance with the then current Rules of Zoological Nomenclature, changed the spelling of the name to *P. murtfeldtae*. This was a justified emendation and is the spelling in use today.

Since Howard (1894) designated no type-species in his original description, both *P. murtfeldtae* and *P. aurantii* were available for subsequent designation as type-species. Ashmead (1904b: 345, 386) lists *P. murtfeldti* (sic) as the type-species. This was the first designation of a type-species and set *P. murtfeldtae* as type by subsequent designation. Howard (1907), apparently overlooking this, listed *Prospalta aurantii* (Howard) as the type. However, Rust (1913) pointed out that Ashmead's (1904b) previous designation of *P. murtfeldtae* as the type must hold. Rust stated that this is unfortunate because *P. murtfeldtae* is rather less typical of the genus, as now known, than is *P. aurantii*. Thus, over the years, the generic concept of *Prospaltella* that became used in the literature was that of *P. aurantii* and not *P. murtfeldtae*. For this reason Nikol'skaya and Trjapitzin (1965) appealed to the International Commission of Zoological Nomenclature to use its plenary powers to set aside all previous designations of type-species for the genus *Prospaltella* and designate *Coccophagus aurantii* as the type-

species. In Opinion 845 (ICZN, 1968) the Commission approved this appeal and designated *Coccophagus aurantii* Howard, 1894 as type-species, by designation under the plenary powers, for the genus *Prospaltella* Ashmead. Unfortunately, this designation was overlooked in the recently published "Catalog of Hymenoptera in America North of Mexico" (Gordh, 1979) where *P. murtfeldtae* (as *P. murtfeldiae*) not *P. aurantii* was given as the type-species.

Nikol'skaya and Trjapitzin (1965) stated that *P. murtfeldtae* should belong to the genus *Coccophagoides* Girault, 1915. Our examination of *P. murtfeldtae* immediately revealed that it not only differed from *Coccophagoides* but also differed from *P. aurantii* and most other species now placed under *Prospaltella* in many characters that are sufficiently significant as to require placement of *P. murtfeldtae* in a different genus. Having compared type material and other specimens of *P. murtfeldtae* with a slide bearing parts of the holotype of *Coccophagoides abnormicornis* Girault, with several other *Coccophagoides* spp., with *Encarsia tricolor* Foerster, and with many other species of *Encarsia*, we are erecting a new genus to contain this species.

Primaprospaltella DeBach and LaSalle, New Genus

Type-species.—*Prospalta murtfeldtae* Howard, 1894.

This genus is characterized as follows:

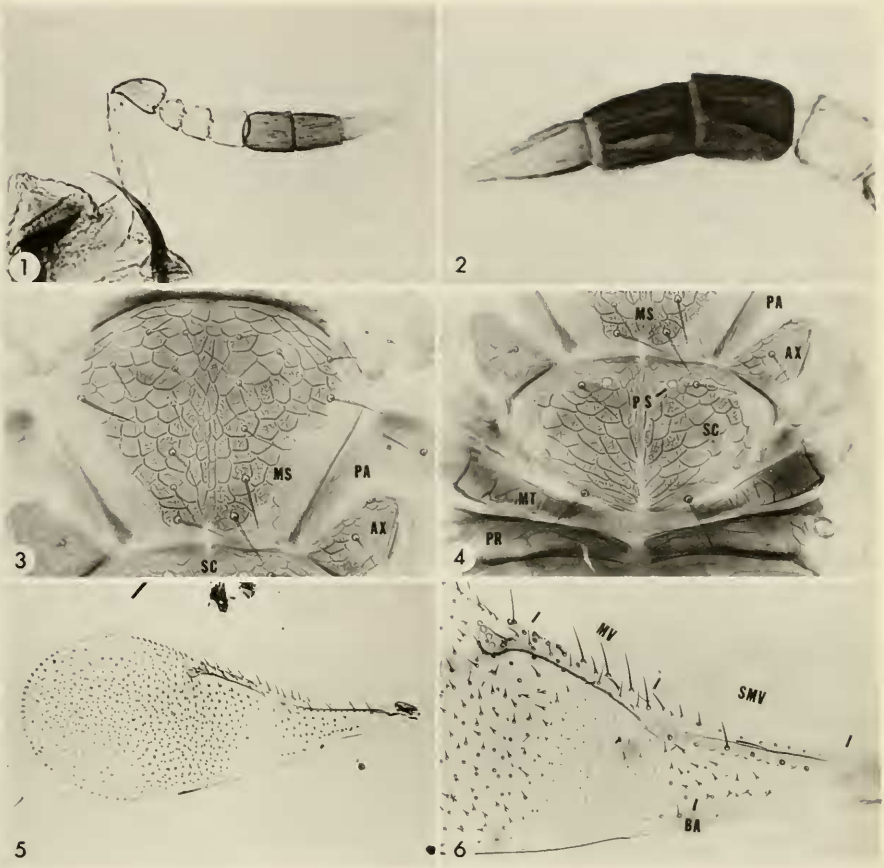
Female.—Mandible with one tooth and a broad truncation. Maxillary palpus 2-segmented, labial palpus 1-segmented.

Antenna (Fig. 1) 8-segmented (1133), the 3-segmented club noticeably differentiated from the funicle. Funicle segments 1 and 2 of about equal length, but funicle segment 2 wider. Funicle segments 1 and 2 wider than long, funicle 3 about as long as wide. First club segment the widest flagellar segment, the next segments narrower, the ultimate club segment narrow, lengthened, cone-shaped. This gives the club a strongly tapered appearance (Fig. 2).

Pronotum composed of 2 sclerites. Mesoscutum trapezoid, broader at broadest point than long, bearing 14–18 setae (Fig. 3). Scutellum broader than long, with 4 setae and 2 placoid sensilla (Fig. 4). Propodeum longer medially than the metanotum (up to twice as long) (Fig. 4). Parapsis with 3 setae, axilla with 1. All tarsi 5-segmented. Ovipositor exserted just past tip of abdomen.

Forewing (Figs. 5, 6) uniformly setose without speculum or other bare areas. Submarginal vein distinctly longer than marginal vein, with no break in vein before junction with marginal vein. Stigmal vein with 2–3 setae. Disc densely setose. Basal area of forewing (area beneath the bullae on the submarginal vein) with 15–30 setae.

Male.—Resembles female in general except for usual sexual differences.



Figs. 1–6. *Primaprospaltella murtfeldtae*, female. 1, Antenna. 2, Club. 3, Mesoscutum. 4, Scutellum, metanotum, propodeum. 5, Forewing. 6, Forewing, basal half. Abbreviations: AX = axilla; BA = basal area; MS = mesoscutum; MT = metanotum; MV = marginal vein; PA = parapsis; PR = propodeum; PS = placoid sensilla; SC = scutellum; SMV = submarginal vein.

Antennae (Fig. 7) 8-segmented (1133). Club not as noticeably differentiated as in female. Apical segment tapered, 1st club segment not distinctly wider than rest of flagellum.

Included species:

Primaprospaltella murtfeldtae (Howard), NEW COMBINATION, (type-species). *Prospalta murtfeldtii* Howard, 1894, U.S. Dep. Agric., Insect Life 7(1): 6–7.

Primaprospaltella maculata (Howard), NEW COMBINATION. *Prospalta maculata* Howard, 1907, U.S. Dep. Agric., Bur. Ent., Tech. Ser. 12(4): 79–80.

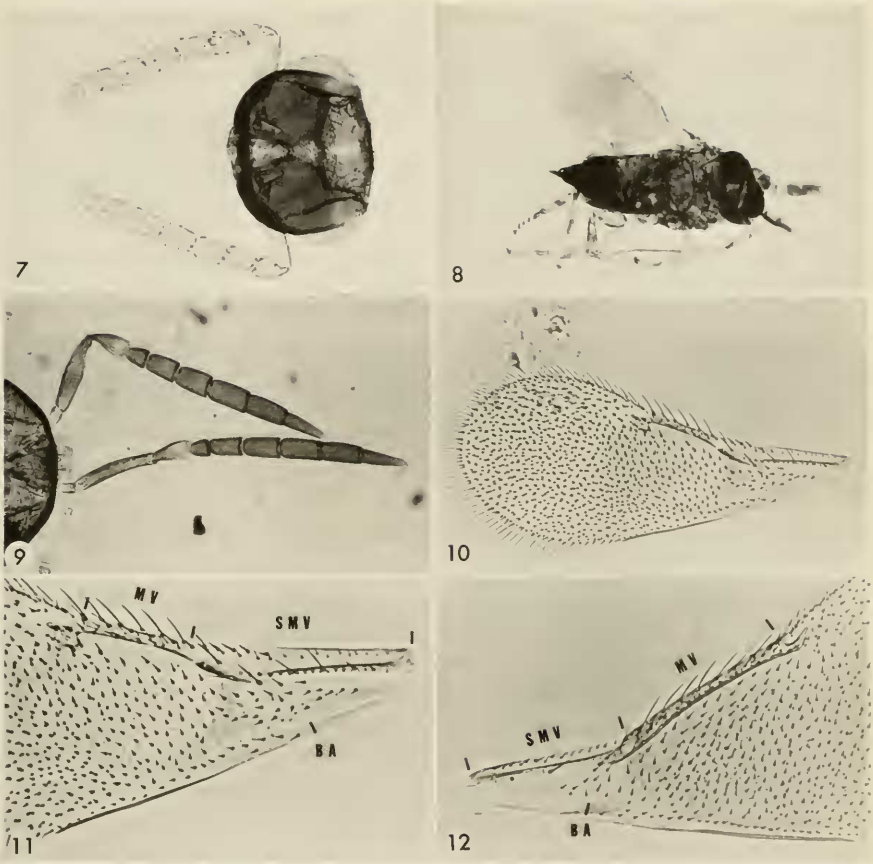
Discussion.—*Primaprospaltella* belongs to the Prospaltellinae (sensu Nikol'skaya and Jasnosh, 1966; Jasnosh, 1976). As previously stated, *Primaprospaltella murtfeldtae* has been thought by authors to belong to the genus *Coccophagoides* Girault as well as to what is now considered *Encarsia*. The first two genera are more similar, and are distinguished from all other genera in this subfamily by having two-segmented maxillary palpi (instead of one-segmented), having the submarginal vein distinctly longer than the marginal vein (as opposed to of about equal lengths or the marginal vein longer), and in having a relatively more setose basal area, i.e., that area beneath the bullae on the submarginal vein (see Figs. 6, 11, 12). In *Coccophagoides* there are 8–20+ setae (Figs. 10, 11), in *Primaprospaltella* there are 14–30+ setae (Figs. 5, 6), in *Encarsia* there are 0–12 setae, usually less than 6 (Figs. 12, 13, 15, 17).

Primaprospaltella can be separated from *Coccophagoides* by several characters. Doutt (1966) gives an historical review of the genus *Coccophagoides* and mentions for the first time the presence of a hypogynium in this genus. The hypogynium is a modification of the apical sternite of the abdomen into a plow-shaped structure. This same type of structure is seen in *Aphelinus* Dalman, but *Coccophagoides* is the only genus in the Prospaltellinae where it is found.

Also, all *Coccophagoides* we have examined have six setae on the scutellum while *Primaprospaltella* has four. We find that the number of scutellar setae is quite constant throughout genera in this subfamily, and thus is a good generic character. In fact, *Coccophagoides* is the only genus placed in the Prospaltellinae with six instead of four setae on the scutellum.

There are some subjective characters that can be used to distinguish these genera. The antennae have been thought by authors to be similar in these groups, but we consider them to be quite dissimilar (see Figs. 1, 2, 9). In *Coccophagoides* (antenna, Fig. 9) the antenna is rather long and narrow. The first funicle segment is distinctly shorter (usually less than half the length) than the second funicle segment. The second and third funicle segments are both distinctly longer than wide, and the third funicle segment and the first club segment are of approximately the same width. In *Primaprospaltella* (Figs. 1, 2) the antenna is short and stout. The three funicle segments are all subquadrate, the first segment being narrower but usually little if any shorter than the second. The second and third segments are at most only slightly longer than wide, and the first club segment is clearly the widest flagellar segment, being noticeably wider than the third funicle segment.

In *Coccophagoides* there is sometimes a break or narrowing in the submarginal vein just before it joins the marginal vein that is not present in *Primaprospaltella*.



Figs. 7–8. *Primaprospaltella murtfeldtae*. 7, Head and antennae, male. 8, Lectotype female. Figs. 9–11. *Coccophagoides comperei*, female. 9, Antennae. 10, Forewing. 11, Forewing, basal half. Fig. 12. *Encarsia tricolor*, female forewing, basal half. Abbreviations: BA = basal area; MV = marginal vein; SMV = submarginal vein.

Primaprospaltella can be distinguished from *Encarsia* by the distinctly dissimilar antennae, by having more than 14 setae in the basal area of the wing, having 2 segmented maxillary palpi and 1 segmented labial palpi (palpal formula 2-1), and in having the submarginal vein distinctly longer than the marginal vein.

Characters used to separate these three genera are given in Table 1.

Both species included in *Primaprospaltella* have distinct maculations. The legs are banded and there are light and dark patterns on the thorax. We are not certain whether this will prove to be a valid generic character.

We now include only *Primaprospaltella murtfeldtae* and *P. maculata* in

Table 1. Characters used to differentiate *Coccophagoides*, *Primaprospaltella*, and *Encarsia*.

Coccophagoides	*Primaprospaltella*	*Encarsia*
Palpal formula 2-1	Palpal formula 2-1	Palpal formula 1-1
Marginal vein distinctly shorter than submarginal	Marginal vein distinctly shorter than submarginal	Marginal vein of about equal length or longer than submarginal
8–20+, usually more than 10, setae in basal area of forewing	More than 14, usually 20–30, in basal area of forewing	0–12, usually less than 6, setae in basal area of forewing
Hypogynium present	Hypogynium absent	Hypogynium absent
6 setae on scutellum (and 2 placoid sensilla)	4 setae on scutellum (and 2 placoid sensilla)	4 setae on scutellum (and 2 placoid sensilla)

this genus. Both are primary parasites of Diaspididae. However, a complete study of all the species presently included in *Encarsia*, *Coccophagoides*, and related groups will probably reveal additional members of this genus. Dozier (1928: 37) refers to a small group of species that may fall in this genus. However, we have not examined these and we do not feel that we can place them accurately solely on their descriptions.

Howard (1894) described *Prospalta murtfeldtae* from "five balsam-mounted specimens reared by Miss Mary E. Murtfeldt, at Kirkwood, Mo., from *Aspidiotus uvae*." We have examined these cotypes and designate one the LECTOTYPE. This is the top right specimen on the slide, which we have clearly marked. A photograph of the lectotype is given in Fig. 8. This slide is deposited in the U.S. National Museum, type number 2708.

Encarsia Characterization

Viggiani and Mazzone (1979), considering *P. aurantii* not generically distinct from *Encarsia* Foerster, 1878, synonymized *Prospaltella* with *Encarsia*. We agree with this synonymy and consider that almost all of the species currently placed in *Prospaltella* belong in *Encarsia*. The only current exceptions are *Prospaltella murtfeldtae* (Howard) and *P. maculata* (Howard) which we have placed in the new genus *Primaprospaltella*. *Encarsia* thus contains numerous parasites of both Aleurodidae and Diaspididae.

The major characteristics of *Encarsia* remain those of the type, *Encarsia tricolor* Foerster, 1878, although there is considerable variation among the many species now included in *Encarsia*, so that at some future time it may be desirable to erect new genera (see DeBach and Rose, 1981). Our concept of *Encarsia* follows.

Encarsia Foerster, 1878

Type-species.—*Encarsia tricolor* Foerster, 1878, type by original designation.

Encarsia is placed in the subfamily Prospaltellinae (Nikol'skaya and Jasnosh, 1966; Jasnosh, 1976).

The genus *Encarsia* was described by Foerster in 1878. With the generic description he described one species, *E. tricolor*, which he designated as the type-species. He stated that he described this species from a single male specimen. Nowicki (1929: 159) stated that he examined this specimen which was kept in the Berlin Museum and that is a female not a male.

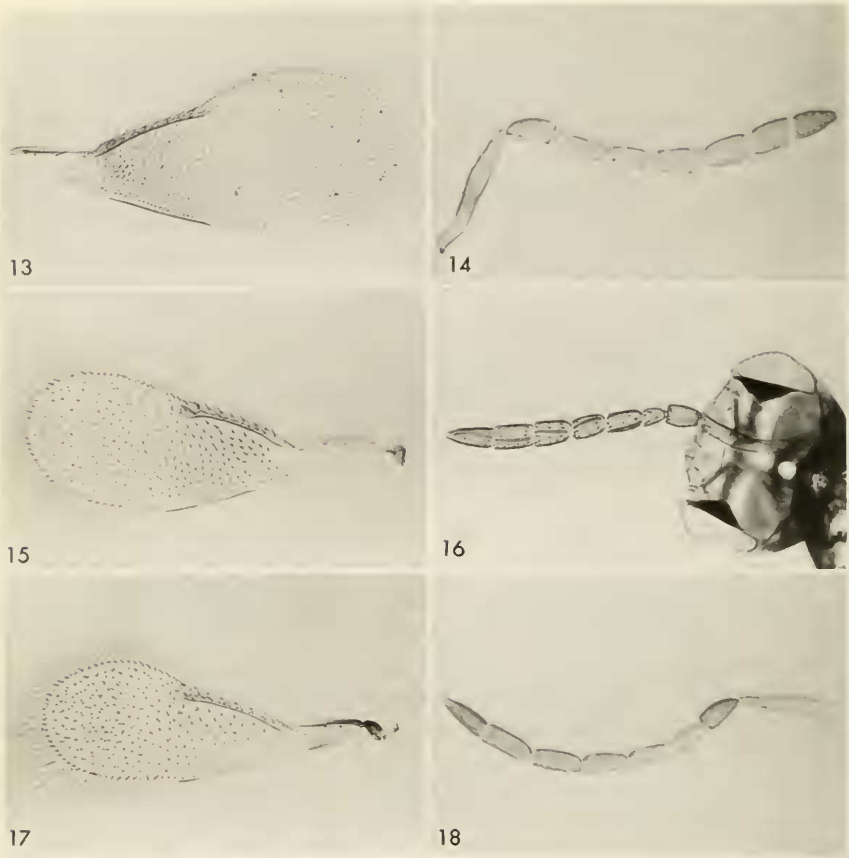
We have not examined this type-specimen, but we have examined another female from Foerster's collection in Naturhistorisches Museum in Vienna. Nowicki mentioned this same specimen (1929: 160) and stated that it agreed fully with the type, "stimmt volkommen mit der Type überein."

Our concept of the principal characteristics of *Encarsia*, sensu latu, are as follows:

Female.—Antenna (Figs. 14, 16, 18) 8-segmented (1133 or 1142), with club sometimes scarcely differentiated from funicle, making it difficult in these cases to ascertain whether the club is 2 or 3 segmented. First funicle segment can range in size from subquadrate and about ½ length of 2nd funicle segment up to equal in length to 2nd funicle segment. Funicle segment 2 through to the last flagellar segment longer than wide. Scape cylindrical, not or only slightly produced or flattened. Maxillary palpus 1-segmented, labial palpus 1-segmented.

Pronotum consisting of 2 distinct sclerites. Mesoscutum bearing from very few setae to many (4, perhaps fewer, to as many as 16; 8–10 in *E. tricolor*). Scutellum broader than long and bearing 2 placoid sensilla and 4 setae. Parapsis with 1–3 setae, axillae with 1–3 setae. Tarsal formula 5-5-5 or 5-4-5.

Forewing (Figs. 12, 13, 15, 17) with marginal vein about equal to or longer than submarginal vein. Postmarginal vein extremely short or absent, stigmal vein short, the latter bearing one or more setae. Forewing quite variable in shape and setation. Setation on disc sparse to moderate. No speculum present. Less than 12 (usually less than 6) setae in basal area of wing (that area beneath bullae on submarginal vein). *Encarsia tricolor* is one of the more setose species having moderately dense setation on the wing disc and 8–12 setae in the basal area (Figs. 12, 13). Wing shape varies from fairly broad (in *E. tricolor* the length is only about 2.25× the width) with a fairly short marginal fringe (about ¼ the width of the disc), to rather narrow (up to nearly 3× as long as wide) with a fringe nearly or slightly exceeding ½ width of disc (Fig. 17). Posterior margin of the wing generally smoothly rounded. In some forms a small rounded asetose area is found on the disc adjacent to the stigmal vein.



Figs. 13–14. *Encarsia tricolor*. Figs. 15–16. *E. perniciosi*. Figs. 17–18. *E. formosa*. 13, 15, 17. Forewing of female. 14, 16, 18. Female antenna.

Abdomen structure normal. Ovipositor not or only slightly exserted. Seventh sternum not extending past about ¾ length of abdomen.

Discussion.—As mentioned previously, Viggiani and Mazzone (1979) synonymized *Prospaltella* with *Encarsia*. They also synonymized *Trichaporus* and *Aspidiotiphagus* with *Encarsia*. We have reviewed the status of *Prospaltella* and *Trichaporus* in this paper, and in a companion paper, DeBach and Rose (1981), discuss *Aspidiotiphagus*.

The synonymization of *Prospaltella* with *Encarsia* makes a very large genus with considerable variation between species. Viggiani and Mazzone do not characterize the genus *Encarsia*, per se, but they indicate the extent of variation they consider to exist by defining 14 species-groups. While we do not agree with them in certain cases regarding the species placed in a

particular group, or even with the validity of certain groups, we consider this work to constitute a strong contribution in the right direction.

The genus *Encarsia* includes parasites mainly of Aleurodidae and Diaspididae, although the males of some species may be hyperparasitic, sometimes even on the females of their own species (adelphoparasitism), and in a few cases males are known to develop in the eggs of Lepidoptera (Flanders, 1959; Nikol'skaya and Jasnosh, 1966). Many species are thelytokous.

Status of *Trichaporus*

Whether or not to assign a particular species to *Encarsia* or *Trichaporus* and whether one is a synonym of the other has been a continuing source of taxonomic confusion. Various authors treat them as distinct genera (Peck et al., 1964; Trjapitzin and Jasnosh, 1978) whereas others have considered one to be a synonym of the other; for example, Dozier (1933) synonymized species of *Encarsia* under *Trichaporus* and Viggiani and Mazzone (1979) synonymized *Trichaporus* under *Encarsia*. Our analysis and conclusions follow.

Trichaporus Foerster, 1856

Type species.—*Euderus columbianus* Ashmead, 1888.

Throughout the following discussion the genus spellings *Trichaporus* and *Trichoporus* are variously used depending upon the usage by the authors being discussed.

Foerster (1856: 84) described the genus *Trichaporus* in the Tetrastichoidae, but included no species. The genus was subsequently mentioned (Taschenberg, 1866: 109; Kirchner, 1867: 186; Dalla Torre, 1898: 27, 159), but still without included species. Ashmead (1900: 561) in "Insects of New Jersey" listed the genus *Trichoporus* Forst. Under it he placed "*T. columbianus* Ashm. Lives in Cecidomyid galls, widely distributed (Ashm.)."

Even though he does not specifically state it in this article, this species is undoubtedly *Euderus columbianus* Ashmead, 1888. Ashmead only described two nearctic eulophids with the specific name *columbianus*. Of these two, only *Euderus columbianus* is associated with cecidomyiids, which it parasitizes. Ashmead (1904b: 374) further links *Euderus* and *Trichaporus* when he lists "*Euderus* Thomson nec Haliday (=*Trichoporus* Forster)."

In a later edition of "Insects of New Jersey," Crawford (1910: 641) listed *Trichoporus* under the genus *Euderus* stating, "*E. columbianus* Ashm. (*Trichoporus*) lives in Cecidomyiid galls and is widely distributed (Ashm.)." Crawford worked at the U.S. National Museum after Ashmead and presumably had access to his material. Girault (1912) published a note in two parts on *Trichaporus*. Although he states that he cannot connect them directly, he also assumes that Ashmead's *T. columbianus* is *Euderus columbianus*.

It seems certain, then, that the first nominal species placed in the genus *Trichaporus* was *Euderus columbianus* Ashmead.

Ashmead (1904b) placed four more species in *Trichoporus*. Girault (1912) designated one of these four, *T. melleus* Ashmead, 1904, as the type-species. He mentions *T. columbianus*, but he felt that *T. columbianus* couldn't be the type-species because it possessed characteristics different than those used in Ashmead's (1904b) characterization of the genus.

Kurdjumov (1913: 2) mentions *Trichoporus* in a paper published in Russian on the Tetrastichini. This paper was translated into French by Nowicki (1927)[1]. Kurdjumov went to Foerster's collection in Vienna to study his material. There were six species labeled as belonging to the genus *Trichaporus*. Two were eulophids, and four were aphelinids. Of these six only one, *Euderus arithmeticus*, was ever described by Foerster (although see previous footnote). The remainder were represented only by Foerster's manuscript names. Kurdjumov chose the first species placed in the collection under *Trichaporus* to be the type-species. This was one of the eulophids, *T. solutus* (manuscript name). He considered this species as belonging to the genus *Astichus* and accordingly synonymized *Trichaporus* with *Astichus*.

Gahan and Fagan (1923: 147) considered *T. melleus* from Girault's (1912) designation, not *T. solutus*, to be the type-species. They point out that "inasmuch as the Ashmead species were the first to be included in the genus, one of these must be made the type." They overlook the fact that *E. columbianus* was the first included species as it had been placed in the genus four years earlier than *T. melleus*.

Nowicki (1929) considered that Ashmead (1904b) misunderstood Foerster's original concept of the genus. He stated that Ashmead's species differed from Foerster's original description by two very important characters. Foerster described *Trichaporus* as having 8-segmented antennae and a scutellum without scutellar grooves. All of Ashmead's (1904b) species have 9 or 10-segmented antennae and grooves on the scutellum. Ashmead was aware of these characters for he used them in his key. Nowicki thus felt that none of these species was suitable for the type-species. However, Nowicki (1929) does not mention *T. columbianus* of Ashmead (1900).

Nowicki also did not accept *T. solutus* as type. He felt that Foerster's generic diagnosis didn't correspond to either of the eulophids in his (Foerster's) collection. Nowicki thus reasoned that these eulophids must have

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[1] There seems to be a slight discrepancy between Kurdjumov's original Russian paper and Nowicki's French translation concerning what name Foerster actually applied to one of the species in his collection. Kurdjumov reads "a ♂ *T. arithmeticus* Forst., which is a synonym of *Euderus arithmeticus* . . . ." Nowicki's translation reads "a ♂ *Euderus arithmeticus* . . . ."

been placed accidentally in with *Trichaporus* through a mistake during rearrangement of the collection. Nowicki recognized the four aphelinids placed under *Trichaporus* as belonging to four different genera. He chose one of these, *T. aleyrodis* (manuscript name), as the type-species and placed the genus in the Aphelinidae. Since this was not a nominal species, it was not available as a type-species. He suggested that the Ashmead (1904b) species that had been placed in *Trichoporus* not *Trichaporus* could remain in the separate genus *Trichoporus* Ashmead, 1904, with *T. melleus* as the type-species and be placed in the Tetrastichini.

Mercet (1930a) treated *Trichaporus* and gave "Genotipo: *Trichaporus aleyrodis* Forster, in litt." after Nowicki. He felt, however, that this designation was "muy discutible." He pointed out that while Nowicki thought that neither *T. melleus* nor *T. solutus* was suitable as the type-species, *T. aleyrodis* didn't fit Foerster's original description either because *T. aleyrodis* is pentamerous. Foerster described *Trichaporus* as being tetramerous.

Mercet felt that the whole matter had become such a puzzle that the problem should be referred to the Commission of Nomenclature of the Zoological Congress for them to assign a definitive type-species for *Trichaporus*. In this same paper Mercet described *Trichaporus aleyrodis* (as *Trychaporus aleyrodis*). This misspelling is obviously a lapsus as he spells *Trichaporus* correctly throughout the rest of his paper. This species thus became *Trichaporus aleyrodis* Mercet, 1930.

Dozier (1933) synonymized *Encarsia* with *Trichaporus*, accepting *T. aleyrodis* as the type-species. He states that Nowicki "has shown that *Trichaporus* Forst. is distinct from *Trichoporus* Ashm." and agrees that *Trichoporus* Ashm. should be a separate genus with *T. solutus* as the type-species.

Boucek (1963: 273) also stated that *Trichoporus* Ashmead has nothing to do with *Trichaporus* Foerster. He felt that Nowicki fixed *T. aleyrodis* as the type-species of *Trichaporus* which belongs in the Aphelinidae, and that *Trichoporus* Ashmead belongs in the Tetrastichinae.

Viggiani and Mazzone (1979) list "*Trichaporus* (Foerster), Novicky, 1929" as a synonym of *Encarsia*. They give the type-species as "*Trichaporus aleyrodis* (Foerster), Novicky."

The only thing that appears clear up to this point is that there has been deep and continuing confusion about this problem. Ashmead continually used the spelling *Trichoporus* even though he clearly attributed this genus to Foerster. It is obvious that he was referring to the same taxon and the difference in spelling is an emendation. It seems logical to assume that he was just correcting Foerster's use of an "a" as the connecting vowel. The proper spelling of the word formed from these two Greek roots is *Trichoporus* (personal communication by Dr. A. Bandy, Professor of Classics, Literatures and Languages, University of California, Riverside).

It was not uncommon for early workers to correct such mistakes as a matter of routine upon discovering them. Even though grammatically correct, this change constitutes an unjustified emendation and this name becomes *Trichoporus* Ashmead, 1900, not 1904 as previous authors have stated. As an emendation it automatically becomes an objective junior synonym of *Trichaporus* Foerster, 1856.

The fact that these two genera are objective synonyms clarifies matters. As objective synonyms they must represent the same taxon and share the same type-species; thus one of them cannot be placed in the Aphelinidae while the other is placed in the Tetrastichinae.

Once it is understood that *Trichoporus* Ashmead is an objective junior synonym of *Trichaporus* Foerster, it is easy to determine the correct type-species. The International Code of Zoological Nomenclature (1961) states in Article 69: "If no nominal species were included at the time the genus was established, the nominal species-group taxa that were first subsequently and expressly referred to it are to be treated as the only originally included species." And further: "If only one nominal species was first subsequently referred to a genus, it is ipso facto the type-species, by subsequent monotypy."

The code thus makes it quite clear that the type-species of *Trichaporus* Foerster is *Euderus columbianus*, type by subsequent monotypy. The code does not consider how well the first subsequently referred nominal species fit the original generic concept. The fact that they are the first, whether placed accurately or not, make them the only species available to be designated as the type-species. Actually, and apparently quite coincidentally, *T. columbianus*, of all the species ever placed in the genus, seems to best fit Foerster's (1856) original genus description as it has four-segmented tarsi, eight-segmented antennae, and a scutellum without grooves.

Euderus columbianus is now considered a synonym of *Galeopsomyia haemon* (Walker) (Burks, 1975: 144). *Euderus columbianus* was chosen by Girault (1916) as the type-species of his new genus *Galeopsomyia*. *Galeopsomyia* is thus an objective junior synonym of *Trichaporus*.

The genus *Trichaporus*, since Ashmead's placement of *E. columbianus* in it, has never been used in its proper sense. It has since been assigned three different type-species by three different authors (*T. melleus*, *T. solutus*, *T. aleyrodis*). All of these type-species assignments were incorrect and two of three were not available for consideration as type-species when assigned.

Proper placement of this genus now would disrupt taxonomy within the Eulophidae by creating a senior objective synonym to *Galeopsomyia*, a genus name which has been in use for 65 years.

To request a change of type-species to any of the previously used type-species would also be disruptive. In the case of making *T. melleus* Ashmead

the type-species, *Trichaporus* would become a senior synonym of *Exurus* Philippi, 1873. *Trichaporus solutus* is a nomen nudum and not available for designation as type-species. If *T. aleyrodis* Mercet were designated as the type-species, the genus *Trichaporus* would become a senior synonym of *Encarsia* Foerster, 1878. Any of these changes would cause confusion and promote instability within these groups.

For these reasons we are requesting in a separate paper to the International Commission of Zoological Nomenclature that the names *Trichaporus* Foerster, 1856 and *Trichoporus* Ashmead, 1900, which have never been properly placed or used in connection with correct type-species, and because their use has caused long-lasting confusion to workers in the field, be placed on the list of permanently rejected names. The aphelinid species currently residing in *Trichaporus* should be placed in the genus *Encarsia* (as per Viggiani and Mazzone, 1979).

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Literature Cited

Ashmead, W. H. 1888. Descriptions of some new North American Chalcididae. Can. Entomol. 20: 101–107.

———. 1900. Order Hymenoptera. *In* Smith, John B., Insects of New Jersey. 27th Annual Rep. State Board of Agric., Trenton. Supplement. 755 pp.

———. 1904a. New generic names in the Chalcidoidea. Proc. Entomol. Soc. Wash. 6(2): 126.

———. 1904b. Classification of the chalcid flies of the superfamily Chalcidoidea, with descriptions of new species in the Carnegie Museum, collected in South America by Herbert H. Smith. Mem. Carnegie Mus. 1(4), 551 pp.

Boucek, Z. 1963. Studien über europäische Eulophidae, III: Euderinae. Beitr. Entomol. 13(3/4): 257–281.

Burks, B. D. 1975. The species of Chalcidoidea described from North America north of Mexico by Francis Walker (Hymenoptera). Bull. Br. Mus. (Nat. Hist.) Entomol. 32(4): 137–170.

Crawford, J. C. 1910. Super-family Chalcidoidea. *In* Smith, John B., Annual Report of the New Jersey State Museum including a Report of the Insects of New Jersey. Ann. Rep. N.J. State Mus. (1909), 888 pp.

Dalla Torre, C. G. De. 1898. Catalogus hymenopterum hucusque descriptorum systematicus et synonymicus. Vol. V: Chalcididae et Proctotrupidae. Engelmann, Lipsiae, 598 pp.

DeBach, P. and M. Rose. 1981. A new genus and species of Aphelinidae with some synonymies, a rediagnosis of *Aspidiotiphagus* and a key to pentamerous and heteromerous Prospaltellinae (Hymenoptera: Chalcidoidea, Aphelinidae). Proc. Entomol. Soc. Wash. 83(4): 658–679.

DeSantis, L. 1948. Estudio Monografico de los Afelinidos de la Republica Argentina (Hymenoptera, Chalcidoidea). Rev. Mus. La Plata Secc. Zool., N.S. 5(32): 23–280.

Doutt, R. L. 1966. Studies of two parasites of olive scale, *Parlatoria oleae* (Colvée). I. A taxonomic analysis of parasitic Hymenoptera reared from *Parlatoria oleae* (Colvée). Hilgardia 37(9): 219–231.

Dozier, H. L. 1928. Two undescribed aphelinid scale parasites from Delaware (Aphelinidae: Hymenoptera). Proc. Entomol. Soc. Wash. 30(2): 35–38.

———. 1933. Miscellaneous notes and descriptions of chalcidoid parasites (Hymenoptera). Proc. Entomol. Soc. Wash. 35(6): 85–100.

Ferriere, C. 1965. Hymenoptera Aphelinidae d'Europe et du Bassin Mediterranéen. Faune de l'Europe et du Bassin Mediterranéen, 1. Masson, Paris. 206 pp.

Flanders, S. E. 1953. Aphelinid biologies with implications for taxonomy. Ann. Entomol. Soc. Am. 46(1): 84–94.

———. 1959. Differential host relations of the sexes in parasitic Hymenoptera. Entomol. Exp. Appl. 2: 125–142.

Foerster, A. 1856. Hymenopterologische Studien 2. Heft. Chalcidiae and Proctotrupii. Ernst ter Meer, Aachen. 152 pp.

Gahan, A. B. and M. M. Fagan. 1923. The type species of the genera of Chalcidoidea or chalcid flies. Bull. U.S. Natl. Mus. 124: 1–173.

Girault, A. A. 1912. Notes on the Chalcidoid genus *Trichaporus* Foerster of the family Eulophidae, with description of one new North American form from Illinois. Can. Entomol. 44: 49–52, 74–83.

———. 1915. Australian Hymenoptera Chalcidoidea—VII. Encyrtidae. Mem. Queensl. Mus. IV: 1–184.

———. 1916. A new genus of Tetrastichini (Chalcidoid Hymenoptera). Entomol. News 27: 348.

Gordh, G. 1979. Family Encyrtidae, pp. 890–967. *In* Krombein, K. V. et al., Catalog of Hymenoptera in America North of Mexico. I. Symphyta and Apocrita (Parasitica). Smithsonian Institution Press, Washington, D.C. 1198 pp.

Howard, L. O. 1894. Two parasites of important scale-insects. Insect Life 7(1): 5–8.

———. 1907. New genera and species of Aphelininae with a revised table of genera. U.S. Dep. Agric. Bur. Entomol. Tech. Ser. 12(4): 69–88.

ICZN. 1961. International Code of Zoological Nomenclature adopted by the XV International Congress of Zoology. N. R. Stoll et al., eds. Internat. Trust Zool. Nomencl., London. 176 pp.

———. 1968. Opinion 845. *Prospaltella* Ashmead, 1904 (Insecta, Hymenoptera): Designation for a type-species under the plenary powers. Bull. Zool. Nomencl. 25(1): 12–13.

Jasnosh, V. A. 1976. Classification of parasitic Hymenoptera of the family, Aphelinidae (Chalcidoidea). Entomol. Rev. 55(1): 114–120.

Kirchner, L. 1867. Catalogus Hymenopterum Europae. Vindobonae. 285 pp.

Kurdjumov, N. B. 1913. Notes on Tetrastichini (Hymenoptera, Chalcidoidea). Rev. Russe Entomol. 13(2): 243–255 (in Russian). (French translation by S. Nowicki, 1927. Eos, Rev. Esp. Entomol. 3(4): 514.)

Mercet, R. G. 1930a. Afelinidos Palearticos (Hym., Chalc.) 4a nota. Eos, Rev. Esp. Entomol. 6(2): 191–199.

———. 1930b. Los afelinidos de España. Segunda parte. Rev. Biol. For. Limnol., Ser B, 2: 29–106.

Nikol'skaya, M. N. and V. A. Jasnosh. 1966. Aphelinids of the European part of the USSR and the Caucasus. Opred. Faun. SSSR, 91. Nauka, Moscow and Leningrad, 296 pp. (in Russian).

Nikol'skaya, M. N. and V. A. Trjapitzin. 1965. *Prospaltella* Ashmead, 1904 (Insecta, Hy-

menoptera, Chalcidoidea, Aphelinidae): Designation of a type-species under the plenary powers. Z.N.(S.) 1713. Bull. Zool. Nomencl. 22(4): 261–262.

Nowicki, S. 1927. French translation of Kurdjumov, 1913. Eos, Rev. Esp. Entomol. 3(4): 514.

———. 1929. Bemerkungen zu den europäischen Aphelinidae-Gattungen (Hym. Chalc.). Neue Beitr. System. Insektenk. 4(13/14): 153–160.

Peck, O. 1951. Superfamily Chalcidoidea, pp. 410–593. *In* Muesebeck, C. F. W. et al., eds., Hymenoptera of America North of Mexico, Synoptic Catalog. U.S. Dep. Agric., Agric. Monogr. 2, 1420 pp.

———. 1963. A catalogue of the nearctic Chalcidoidea (Insecta: Hymenoptera). Can. Entomol., Suppl. 30, 1092 pp.

Peck, O., Z. Boucek, and A. Hoffer. 1964. Keys to the Chalcidoidea of Czechoslovakia (Insecta: Hymenoptera). Mem. Entomol. Soc. Can. 34: 1–120.

Rust, E. W. 1913. New Peruvian parasites from *Hemichionaspis minor* (Hym.). Entomol. News 24: 160–165.

Taschenberg, E. L. 1866. Die Hymenopteren Deutschlands nach ihren Gattungen und theilweise nach ihren Arten als Wegweiser. Edward Kummer, Leipzig. 277 pp.

Trjapitzin, V. and V. Jasnosh. 1978. Identification manual for insects of the European part of the USSR. Vol. 3, Hymenoptera, Part 2, 756 pp.

Viggiani, G. and P. Mazzone. 1979. Contributi alla conoscenza morfobiologica delle specie del complesso *Encarsia* Foerster—*Prospaltella* Ashmead (Hym. Aphelinidae). 1. Un commento sull'attuale stato, con proposte sinonimiche e descrizione di *Encarsia silvestrii* n. s.p., parassita di *Bemisia citricola* Gom. Men. (Hom. Aleyrodidae). Boll. Lab. Ent. Agric. Silvestri 36: 42–50.

Walker, F. 1857. List of the specimens of lepidopterous insects in the collection of the British Museum. London. Vol. 13, pp. 983–1236.